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Plastic Netting to Protect Trees from Animal Damage

by

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The protection of newly planted stock against animal damage (deer, mice, rabbits, etc.) is essential in establishing hardwood plantations. Repeated clipping and browsing deforms trees until they become bushy, stunted, or even die. Losses as great as 95-99% are not uncommon (Radvanyi 1975). Personal experiences and communication indicate that spraying or painting trees with specific chemicals can repel deer, but the application must be repeated annually and does not protect the succulent growth. Furthermore, chemicals do not prevent rabbits from clipping, and are only partially effective against girdling by mice. Therefore, a mechanical barrier appears to be the only effective protection for several successive years.

One type of mechanical barrier can be created by placing plastic netting (trade name "Vexar")[1] around the planted trees. Forest managers in other countries have experimented with this netting. It is a nonchemical and environmentally safe approach to forest-animal damage control and has been successfully tested on 2+0 and 2+1 Douglas-fir seedlings (Anon. 1972, Borrecco 1976, Campbell and Evans 1975).

Here, I report on tests with Vexar netting on red oak (*Quercus rubra* L.) established in 1978, 1979 and 1980. To my knowledge, this is the first time the netting has been used on hardwoods in Canada.

The Netting

The netting is made of polypropylene with diamond-shaped openings 1.25 x 1.25 cm, and comes in 30-m long rolls of flattened tube (Fig. 1). It can be produced on order in various colours and tube diameters. The colour influences the photodisintegration period, i.e., clear = 9 months, green = 4 years, black = 10 years (Campbell and Evans 1975). In the present tests two black netting diameters were used: 7.5 cm (tested by Campbell and Evans) and 15 cm, a special order for the red oak seedlings. The rolls were cut into sleeves 90, 120 and 150 cm long. Each 90-cm long sleeve was supported by two 45 cm wire rods (No. 9 thickness) interwoven through 2-3 openings about one-third

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[1] "Vexar" is manufactured by DuPont of Canada Limited. Reference to a trade name does not imply Ontario Government endorsement.

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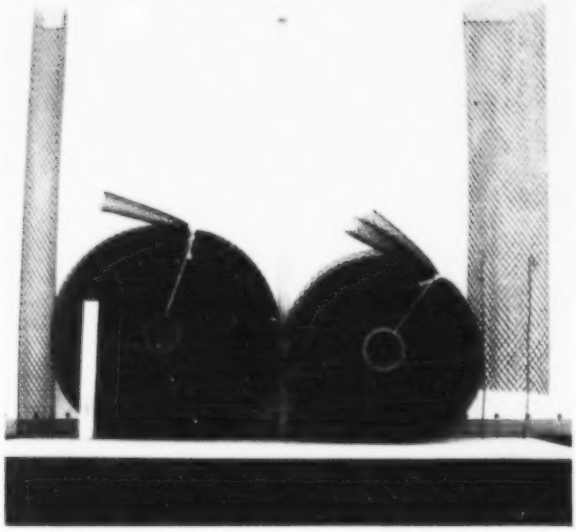

Figure 1 Rolls of 7.5-cm and 15-cm diameter "Vexar" plastic netting with cut sleeves 90 cm long. Note two wire rods as used in the field to support the sleeve (right).

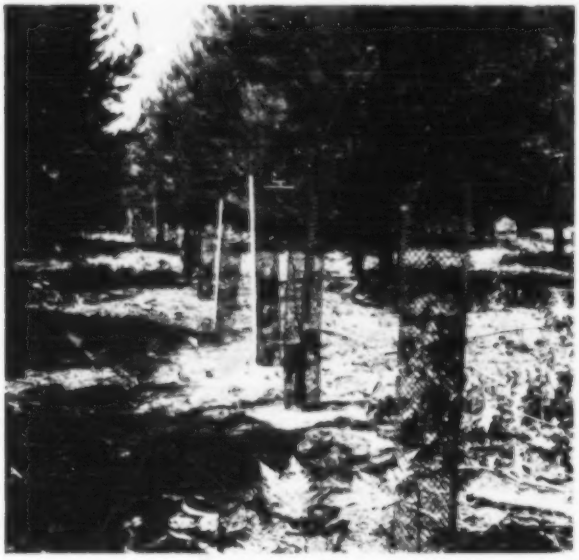

Figure 2 Row of "Vexar" sleeves protecting red oak transplants in a cut strip in Scots pine natural regeneration.

Figure 3 Red oak leading shoot growing outside a 7.5-cm diameter sleeve.

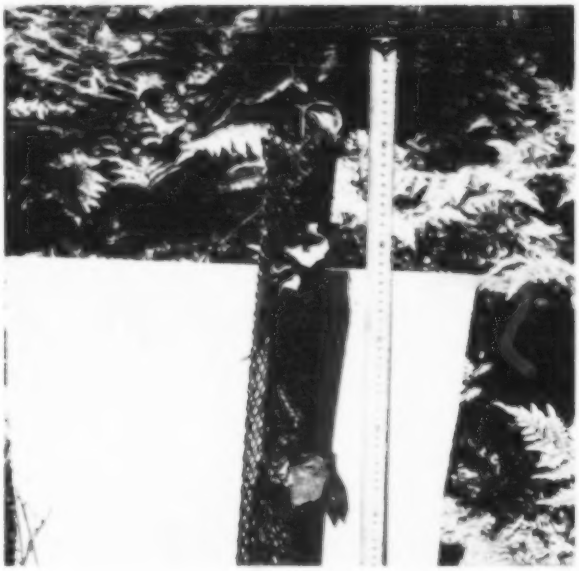

Figure 4 Red oak leading shoot growing through the bunched-up current year's leaves in a 7.5-cm diameter sleeve.

down the sleeve and again near the ground, and pushed into the ground to a depth of about 18 cm. Each of the two longer sleeves was supported by a wooden stake, 2.5 x 5 x 120 cm, hammered into the ground to a depth of about 25 cm. The stake was placed outside the sleeve and fastened to the sleeve with "stove" wire at the top and near the ground.

Planting Stock

Mostly 2+0 but also 1+0 red oak were used. The stock was culled in the field by size, form, number of buds on the leading shoot, and physical damage to obtain some uniformity. The lateral branches of the 2+0 stock were pruned to fit inside the sleeves; branch pruning of the 1+0 stock was seldom necessary. Most of the 2+0 stock was conventionally root-pruned to facilitate planting. A total of about 4000 units were planted.

Experimental Plantings

Three plantings were established in the Huronia Forest District, south-western Ontario.

Area 1 -- located in 8 ha of dense Scots pine natural regeneration, about 8 years old, in Hendrie Forest, 12 km north of Barrie. In this regeneration, 28 strips, 7 m wide, 120 m long and 7 m apart, were mowed down to the ground. About 80 trees were planted in the fall of 1978 and spring of 1979 and 1980 at 1.5 m intervals in each strip (Fig. 2). Two diameters and three lengths of netting were used. Ten percent of the trees, scattered throughout the strips, were left unprotected. The Scots pine regeneration sheltered a large population of rabbits that repeatedly browsed all natural hardwood regeneration; mice were also observed.

Area 2 -- is an 8-year-old red pine plantation, about 4 ha in size, located near Area 1 in Hendrie Forest. Spacing was 1.8 x 1.8 m. About 130 red oak seedlings were planted at 1.5 m intervals between the rows of pine in each of four 22 m^2 plots in the spring of 1979, using the 7.5 cm diameter netting at three lengths. Ten percent of the red oak in each plot were left unprotected. This area was exposed to severe browsing by rabbits and some girdling by mice.

Area 3 -- located in a 13-ha red oak - white pine - white ash - sugar maple mature stand, 60-80 years old, in the Dufferin Camp Forest, about 25 km southwest of Barrie. The stand was cut in 1979-80 removing all commercial timber. In spring 1980, three rectangular areas, each about 0.3 ha, were cleared of all remnant trees and underbrush. Uncleared understory buffer zones about 25 m wide were left between the openings. The openings are bordered by the understory in the south and west, and by mature red pine plantations in the north and east. About 300 trees were planted at 1.5 m intervals in rows 3 m apart in each opening in spring 1980, using netting of two diameters and three lengths. Ten percent of the planted trees in each area were left unprotected. Severe deer browsing was observed on the stump-sprout regeneration which followed the cutting.

Protection Afforded

In October 1980, there was no damage to the protected trees or netting. All the unprotected trees in Areas 1 and 2 were clipped soon after planting, usually to the ground and the ensuing resprouts were browsed and remained stunted. They are not expected to recover. In Area 3, severe deer browsing was observed throughout the summer of 1980, but the unprotected trees were not damaged. This was probably due to the abundant stump-sprout regeneration and other dense vegetation being available for browsing.

Problems with Netting

Several problems arose with both the installation of the netting and subsequent tree development:

1. The cut sleeves must be rolled up manually against the crease to reshape them from flat to oval or square cross-section. This is very time-consuming but essential to avoid the bending over of the sleeves at stake height by wind, particularly the 7.5-cm diameter sleeves. Later, as the trees gained height and developed side branches outside the sleeves, the latter were supported firmly and prevented from bending over.
2. Trees and sleeves must be perpendicular with the ground to avoid growth of the leading shoot through and outside the sleeve already in the first growing season. If this occurred in the second or third season, the shoot was tall enough to escape from being browsed and continued to grow vigorously outside the sleeve (Fig. 3).
3. The current year's leaves, and some of the previous year's leaves, remained bunched-up in the 7.5-cm diameter sleeves. This appeared to have slowed the progress of the leading shoot which nevertheless assumed dominance (Fig. 4); most of them continued to grow well outside the sleeves after breaking through the mass of leaves. In some cases, a vigorous lower lateral shoot grew outside the sleeve before the terminal shoot broke through the mass of leaves inside. This problem did not occur with the 15-cm diameter sleeves because of the greater growing space available.
4. Bending of the leading shoot inside the 7.5-cm diameter sleeves was observed after winter. This may have been due to the pressure from snow accumulating in the sleeve and remaining there for a longer period than the snow in the surroundings. This results in the curling upwards of the leading shoot during the growing season, i.e. forming an "s-shaped" leader. Whether this is the case also with the 15-cm diameter sleeves requires observation during the winter.

Cost

This netting was produced on request for experimental purposes and the price of $6.50 and $8.50 per 30-m roll of 7.5-cm and 15-cm diameters, respectively, should be taken with discretion. To cut one roll into sleeves, distribute them throughout the area, reshape and fit them over the trees, and insert the rods or stakes and wire required about 3 person-hours. These costs will probably remain the only major limiting factor. However, improvements are possible, such as cutting and reshaping the sleeves mechanically, stapling rather than wiring the sleeves to the stakes, or replacing wooden stakes by less expensive reusable wire rods.

Preliminary Conclusions and Recommendations

Thus far, the black netting has protected the red oak seedlings and secured their establishment in areas subjected to damage from deer and rabbits. Observations will continue to determine whether the netting will affect later growth but it is suggested that small scale tests be undertaken in several districts with a variety of species and netting. The additional expense of protection may be justified in cases such as tree improvement plantations, admixtures, shelterbelts, protection forests and private land-planting requests.

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